# Learning communities as means for teachers' self-training

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## Introduction

Knowledge is the key factor of the development in all sectors in human activity. Through centuries we faced periods that people tried to control knowledge, others that knowledge was more public, and today we live in so called 'knowledge age', where the exchange, production and sharing of knowledge is possible more than ever through the use of Information Technologies. Education is the field that has in its center the development, transmition, and exchange of knowledge. What is in fact that we call knowledge? In order to figure out better a distinction between knowledge, information and data is necessary.

## Distinction between data-information-knowledge

According to Hussain et all (2004) data is a collection of facts, measurements and statistics whereas Information is defined as organized or processed data that are timely (i.e., inference from the data are drawn within the time frame of applicability) and accurate (i.e., with reference to original data). *Knowledge is information that is contextual, relevant and actionable.* The possession of knowledge means that there is the capability of solving problems despite information or data that hasn't the same meaning. Although there might be access to a vast amount of information and data, knowledge is necessary to give meaning, that's why it is more valuable. Knowledge can be reusable over time and is historically relevant, but the value of information tends to decrease over time if the context that produced it doesn't preserve. During time, information accumulates but knowledge evolves.

It's not always easy to distinguish between the three entities. Data, information and knowledge are intertwined and interconnected, affects each other and the value each of them depends on the purpose that is used. Data as well as information need knowledge to be interpreted; on the other hand information and data are structural elements for the production of knowledge. When information is used, it is illuminated from the previous knowledge and the experience, then information doesn't transform to knowledge but changes the existing knowledge by altering the existing cognitive

state of the person, consequently it creates new possibilities for action. (Stenmark 2002).

We don't have to consider data, information and knowledge as separate entities but as a spectrum where data and information are the two ends. Knowledge sometimes can be described with words. Then it can get to information. If information is decontextualized too much, for example it is placed away from the knowledge that is necessary to interpret, is named data. The knowledge that exists in a text is not possible to be interpreted from the reader if the person's knowledge is not compatible with that of the writer so that he/she can interpret fully what the information is about. So something that is information for one person, it is data for another.

We can understand from this that what is concerned as knowledge from the scientific field may be just information for the teachers if this knowledge is decontextualized. Consequently the knowledge that is not connected with the knowledge teachers already have can not be assimilated or developed by them. In contrast teachers that have been incorporated this knowledge in their cognitive field due to other studies or activities and experiences are the source for the contextualization of knowledge.

Types of knowledge are: descriptive, procedural, reasoning, linguistic, presentation and assimilative. Descriptive is information about past, present, future or states concerning *what.* Procedural knowledge concerns *how* and describes step-by-step the procedures that a task can be accomplished. The reasoning knowledge is about *why*, the evaluation of results which is crucial in many cases. The presentation knowledge facilitates communication and concerns the method of knowledge delivery. The *linguistic* knowledge interprets communication once it has been accomplished. The *assimilative* knowledge helps the preservation of basic knowledge by developing the existing knowledge (Hussain et all, 2004).

**Teacher's knowledge**

What we mostly describe as knowledge is stored in manuscripts, databases, texts etc. There is also a part of knowledge that can't be stored. This distinction concerns what we call *explicit* and *implicit* or *tacit* knowledge. According to Nonaka, explicit

knowledge is knowledge that is easily expressed, captured, stored and reused. It can be transmitted as data and is found in databases, books, manuals and messages. In contrast, according to Nonaka tacit knowledge is:

"...highly personal. It is hard to formalize and therefore difficult to communicate to others ...tacit knowledge is deeply rooted in action and in an individual's commitment to a specific context ...tacit knowledge consists partly of technical skills [and partly] of mental models, beliefs and perspectives so ingrained that we take them for granted and cannot easily articulate them." (Nonaka, 1991,: 98)

We can't separate these entities totally. They interact and interconnect in the creative activities of the individuals. Nonaka calls the interaction of these two kinds of knowledge as 'knowledge conversion proccess'.

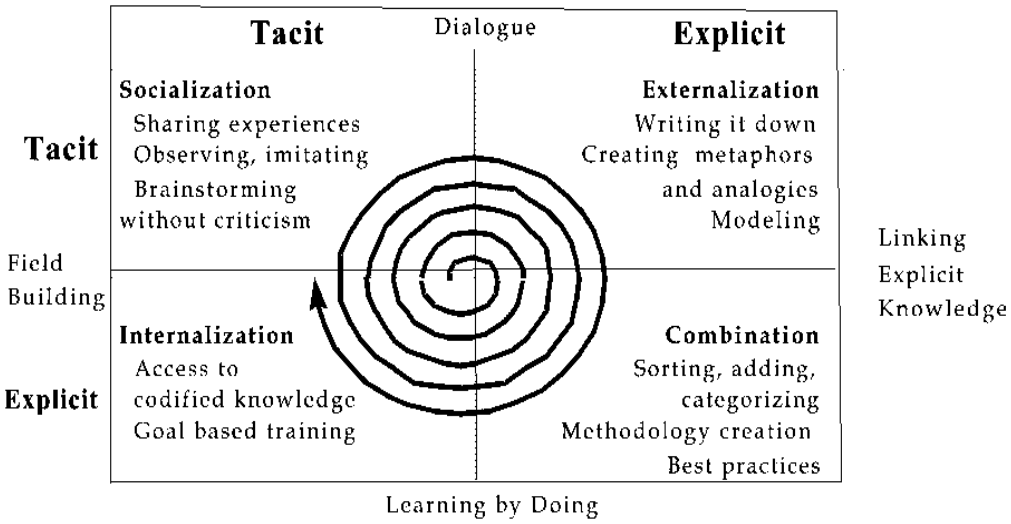


**Figure 1: Nonaka's spiral of knowledge**

As we can see in figure 1 the sharing of tacit knowledge takes place through joint activities and requires physical proximity. We also understand that in order to be assimilated by others, tacit knowledge must first be externalised.
It is crucial to have jointed activities, interactions between professionals but also codification of the main points or results of the activities.

**Production of knowledge**

*Why there is low production of knowledge in education?*

1. Low competition among practitioners and institutions and there are in consequence few knowledge spillovers.
2. Formal R&D is of secondary importance. The capacity and willingness to conduct educational experiments are limited, so many potential benefits of research into learning are not exploited. An explanation might be that teachers lack the skills to do research or the low financing of research.
3. Most of the teachers' practical knowledge remains tacit, so the low level of knowledge codification inhibits the accumulation of know-how. There is much innovation, though little formal R&D. Two factors limit the economic value of those innovations.
4. Linkages and feedback between formal R&D and professional practices are weak so that the practical knowledge of innovative practitioners is rarely drawn upon by professional researchers; and due to low levels of competition and collaboration, information spillovers and the dissemination of innovation are weak.
5. The absence of technical language is a crucial factor for the interpretation of lack of knowledge codification. Without the codification of knowledge, those that are new professionals have to begin from the start, without knowing the previous solutions and the alternative approaches in the confrontation of practical problems. Low level codification in educational sector makes difficult the production of 'learning programs' or codified instructions that can be subject for discussion and development from professionals. Teachers tend to develop their own system of classification in the classrooms. (Foray & Hargreaves, 2003)

**Learning in communities**

The process of knowledge development can be easily supported in the framework of a community. The interchange, the common goals and the sharing of the same 'language' can make the process of socialization, externalization, combination and internalization easier. The same framework, the existence of novices and experts in the same place adnd the solution of meaningful problems is the framework that enhances the sharing, codification and development of knowledge.

How participation in a learning community or in a community of practice can be more effective?

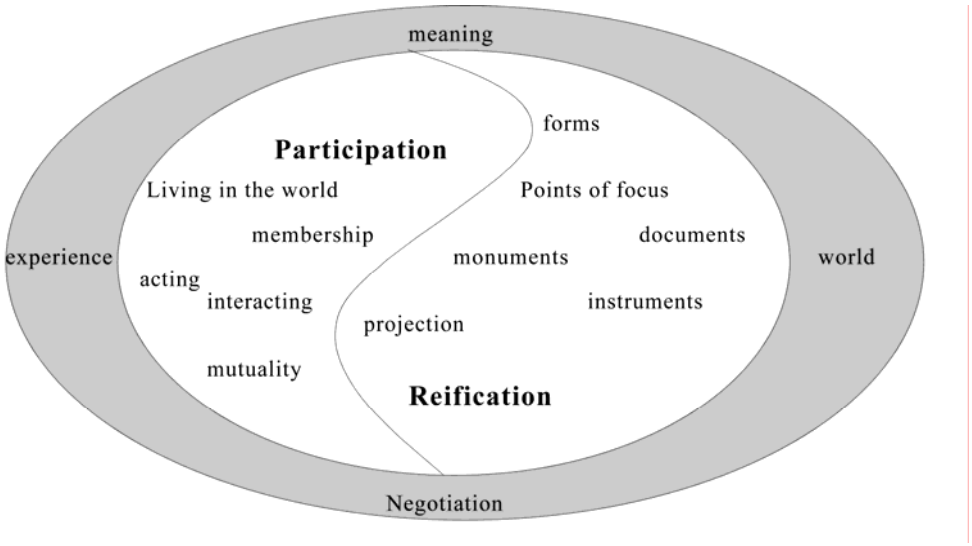


**Figure 2: The Duality of participation and reification** (from Wenger 1998: 63)

The combination of participation with reification results in negotiation of meaning and in knowledge development. Experience is shared through interaction and the knowledge that emerges from the participation is reified with forms, documents, instruments.

The interaction and exchange is possible to take place in two forms of activities: either through cooperative tasks or through competitive tasks (figure 3).

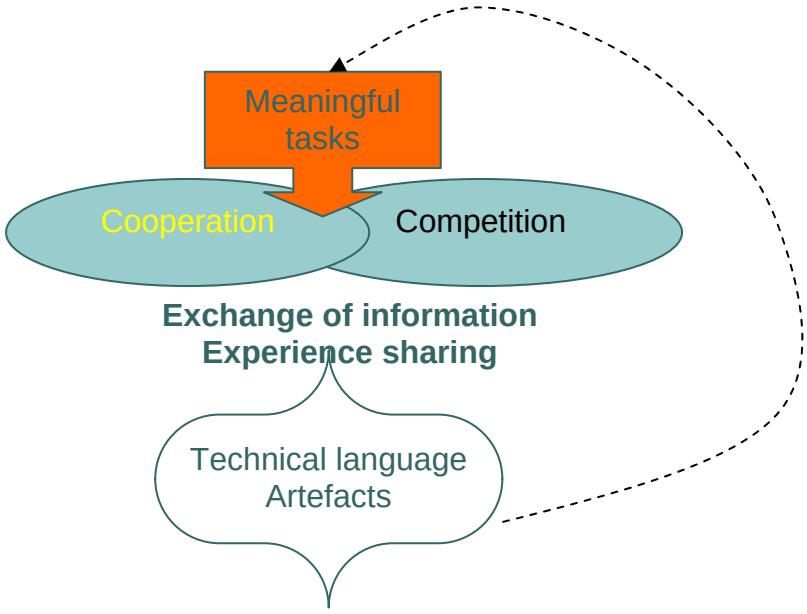


**Figure 3: Framework for knowledge development**

Cooperation forms the useful environment of membership, mutuality and negotiation. This enhances the interaction among the members of the team, the exchange of ideas, experience, concerns and prior knowledge between experts and novices in the group.

On the other hand competition strengthens the bounds of the team and sets an external task to be achieved. Participation in competitive tasks gives the motives to the team to work further in order to develop their skills and knowledge. It enforces the creativity and the brainstorming as well as the problem solving skills. Members have to face true problems and difficult situations; they can test the knowledge and skills that are acquired through cooperative activities. Another important advantage of competitive task is the interaction with other teams and more advanced solutions of the problematic situations. It also extends the borders to the external world and to other knowledge repositories.

An example of the implementation of the scheme of participation – reification through cooperation and competition processes is an educational robotics seminar for students of the Department of Primary Education and for in-service primary school teachers (Anagnostakis et all, 2008, Margetousaki et all 2008). According to the program of the seminar students are working in small groups, they are encouraged to cooperate and solve problems through the use of documents (technical language) but also they have to record their progress through the seminar (reification). During the half time of the seminar they accomplish easy tasks that help them get in touch with the knowledge of the field. The other half of the seminar they have to develop their own construction in order to participate in a robotic contest. This has proved that gives to participants more motives to develop their field knowledge, they face more difficult problems and have the opportunity to get in touch with alternative solutions that other teams gave to the same problem. All the procedure is record through reports and questionnaires they fill and upload in a web portal that has been adjusted for the needs of the seminar.

Results from the analysis of the data (Margetousaki et all, 2008) gathered from the seminar shows that students learn more through the dialogue and members' contribution in the team. The cohesion of the team is increased when team members set the target to be accomplished. The competition gives the opportunity to students to work more freely and in most of the cases spend more time than the required in order to solve various problems.

## Discussion

Training seminars can be the base for the creation of the appropriate framework for knowledge development in education. Further research could broaden these findings and enrich the existing theoretical framework. It is necessary to invest in cooperative and competitive tasks that will give the opportunity to teachers to enrich the existing knowledge and give them the tools to facilitate their teaching practices.

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